

STORMS AND WEATHER WARNINGS.

WASHINGTON FORECAST DISTRICT.

There were few storms during the month of sufficient intensity to justify storm warnings, although small-craft warnings were issued for portions of the Atlantic or the east Gulf coast on the 17th, 18th, 27th, 28th, 29th, and 30th.

Northeast storm warnings were displayed at 10 p. m. of the 4th from Sandy Hook, N. J., to Portland, Me., in connection with a disturbance of moderate intensity moving northeastward over the Middle Atlantic States and a stationary HIGH over northern New England and the Canadian Maritime Provinces. The following morning the display of warnings was extended to Eastport, Me. Verifying velocities were reached at New Haven, Nantucket, and Eastport.

No further storm warnings were required until the evening of the 18th, when southeast warnings were ordered displayed from Delaware Breakwater to Eastport, Me. At this time there was a strong and almost stationary HIGH off the north Atlantic coast and an area of abnormally low pressure from the Mississippi River eastward to the middle Atlantic and south Atlantic coasts. Verifying velocities were reported from Atlantic City, New Haven, and Boston.

A disturbance that remained almost stationary for several days in the Gulf of Mexico a short distance east of the mouth of the Mississippi River was attended by strong easterly winds at Mobile and Pensacola on the 29th and for which northeast storm warnings were issued at 9:30 p. m. of the 28th. This disturbance finally moved inland over the east Gulf States on June 1.

Frost warnings were issued for the cranberry bogs of New Jersey on several dates, for northeastern New York on the 8th and for northern New England on the 26th.—*Charles L. Mitchell.*

CHICAGO FORECAST DISTRICT.

The month of May in the Chicago Forecast District was marked by slow and erratic storm movement, frequent precipitation, and temperatures generally above the seasonal average. No storms of importance crossed the Lake region except the one of the 6th–7th, which caused verifying wind velocities only over Lake Huron and most of the Lower Lake region, Buffalo, N. Y., reporting a maximum of 60 miles an hour from the west on the 7th. No storm warnings were ordered in connection with this disturbance, except at Alpena, Mich., local action being taken by the Official in Charge at that station on the morning of the 7th.

Damaging frosts did not occur at any time during the month east of the 100th meridian, but warnings for frost and freezing temperature were issued for Montana and Wyoming on the 8th, 9th, 10th, 11th, 12th, 13th, 15th, 21st, 22d, 26th, 27th, and 30th, and for the western portions of South Dakota and Nebraska on the 11th and 15th.

Special daily fire-weather forecasts were sent to the Forest Supervisor at Cass Lake, Minn., from the beginning of the month until the 9th, with which message the service was discontinued.

Special warnings were sent to the Wisconsin cranberry marshes on the 13th, 27th, and 31st, but the bogs were flooded in anticipation of these frosts and no damage resulted.

Beginning May 11 and continuing during the month special a. m. forecasts for the benefit of fruit growers in their spraying operations were telegraphed daily to Mr. L. K. Jones, Sturgeon Bay, Wis. These forecasts have usually covered a period of several days. This service is in connection with the research work on fruit diseases in the Door County district of Wisconsin which is being carried on by the College of Agriculture in the State University.

A special forecast service covering a three-day period for Lower Michigan was begun during the latter part of the month, the forecasts being telegraphed Friday mornings to the Official in Charge, Lansing, Mich., for publication in the *Weekly News Letter* of the Michigan State Farm Bureau, through which the special forecasts are distributed to a large number of subscribers throughout the State.

The special weekly forecast service covering the week-end was continued to the editor of the *Reporter-Enterprise*, Oconto, Wis.

In accordance with instructions from the Central Office, special forecasts were made as follows on May 30 and 31 for the National Balloon Race at Milwaukee, Wis., on the 31st:

May 30, 9:44 a. m.

Indications now point to rather unfavorable conditions for start on Wednesday, as showers are probable. However, as the area of high pressure over the northern Rockies this morning moves slowly eastward and southward fair weather is likely after Wednesday. Winds aloft will probably be moderate to fresh westerly Wednesday and Thursday.

May 30, 9:00 p. m.

No change indicated in morning forecast. Western high-pressure area has spread southeastward slowly, but center remains over eastern Montana with diminished pressure.

May 31, 10:00 a. m.

Shallow low-pressure area centered over southern Lower Michigan this morning will move northeastward to-night and Thursday. High-pressure area over Plains States will move slowly southeastward in rear. Showers and possibly thundersqualls indicated next 36 hours, Lower Michigan, Lake Huron, Lower Lake Region, and Ontario, but gradually clearing as far east as Lake Huron by Thursday morning. Rain at Milwaukee will end this afternoon, but clouds will probably not break away until later. Surface winds at start will be moderate northerly, but winds will be westerly aloft, especially above 500 meters, force will probably be from 6 to 10 meters per second, continuing about the same Thursday. No strong winds likely.

May 31, 1:10 p. m.

Shallow trough of low pressure now reaching from southern Lake Huron southwestward and high-pressure area over South Dakota will continue generally eastward movement next 36 hours. Moderate northerly winds will prevail at start at surface with low clouds and probably up to 500 to 1,000 meters. Higher up wind will be more westerly and at about 2,000 meters possibly west-southwest with force from 10 to 15 meters per second. Advise reaching high elevations immediately in order to encounter favorable wind direction and velocity. Clouds will probably continue along entire course.

As advised in the last message telegraphed to Milwaukee on the afternoon of May 31, several of the contestants endeavored immediately to reach a high elevation in order to encounter the westerly movement, but Maj. Oscar Westover, of Washington, the winner of the race, piloting an Army balloon, was the only one who was able to maintain his balloon at a high altitude. He was carried rapidly eastward and landed near Lake St. John, about 100 miles north of Quebec, covering a distance of approximately 900 miles from Milwaukee. Some of the balloonists were able to drift at a high elevation until after crossing the State of Michigan, when, for one

reason or another, they were forced to lower elevations and encountered northerly winds, so that, unless they landed, they were in danger of being carried in a southerly direction. Others, in starting, apparently chose to drift with the northerly winds prevailing below 1,000 meters and were carried south-southwestward from Milwaukee. Mr. H. E. Honeywell, of St. Louis, Mo., an independent pilot, and Lieut. W. F. Reed, of Mobile, Ala., representing the Navy, the winners of second and third places, respectively, landed in southern Missouri, covering a distance of between 500 and 600 miles.—*E. H. Haines.*

NEW ORLEANS FORECAST DISTRICT.

Small-craft warnings were displayed on the Texas coast on the 1st, 8th, 9th, and 10th, being changed to southeast storm warnings on the 1st at 3 p. m. These warnings were justified. Thunderstorms on the east coast of Texas were attended by gales for a brief period, about 8:30 a. m. on the 15th, for which no warnings were displayed.

A disturbance of moderate intensity near the eastern and middle Gulf coasts prevailed from the 25th to the 31st. It was sufficiently intense to warrant the display of northeast storm warnings during the night of the 28th and the following day and night. Warnings were displayed accordingly on the Louisiana coast.

Warning of frost in the Texas Panhandle and extreme northwestern Oklahoma was issued on the 11th.—*R. A. Dyke.*

DENVER FORECAST DISTRICT.

An area of low pressure which began to develop over the southern Rocky Mountain Plateau on the 6th and another disturbance which appeared over British Columbia and Alberta on the same date formed, during the 7th, a trough which extended from the two Canadian Provinces already mentioned southward to northwestern Mexico. On the morning of the 10th the same storm was central over western Colorado, whence it moved slowly northeastward, reaching Manitoba during the 12th. Precipitation occurred in every portion of this district, except southern New Mexico, at some time during the period from the 7th to the 11th, with heavy snows in southwestern Colorado, northern Arizona, and southern Utah on the 9th and 10th. Freezing temperatures followed the disturbance on the 9th in southern Utah and northern Arizona, on the 10th in southwestern Colorado, and on the 11th in extreme north-central and northwestern New Mexico. Night temperatures below freezing continued in most of this area until the morning of the 13th. The passage of the storm center was also attended by gales in Colorado and New Mexico on the 10th, which continued in northeastern Colorado on the 11th. The cold weather and rain and snow were unfavorable for live stock, especially newly shorn sheep and lambs, although there appears to have been but little loss. On the morning of the 12th the temperature was decidedly below freezing in the Gunnison Valley fruit district, reaching 25° at Hotchkiss, but no serious injury to the fruit appears to have been caused by these conditions.

Showers also fell in all except the extreme southwestern portion of the district on the 14th–15th, followed on the 16th by temperatures below freezing in the western valleys of Colorado, due to an area of high pressure which extended from the north Pacific coast south-

eastward to the Panhandle of Texas on the morning of that date. The fruit, however, again escaped injury.

A number of LOWs that moved across the Rocky Mountain region during the latter half of the month were attended by occasional showers in Colorado and Utah, and generally showery conditions on the eastern slopes of Colorado and New Mexico during the last three days accompanied a moderate LOW which occupied most of the southern plateau region, with its center over Arizona.

Frost warnings were issued as follows: For eastern Colorado on the 10th, 11th, and 13th; east of the mountains in New Mexico on the 11th; north-central and northwestern New Mexico on the 13th and 21st; north and west Utah on the 1st and 8th; north Utah on the 10th, 11th, and 26th; and for all of Utah on the 12th. These warnings were generally verified either by the occurrence of frost or temperatures at which frost might be expected.

Light frosts for which no warnings were issued occurred at Grand Junction on the 2d, Modena on the 14th and 21st, and Denver on the 16th.

Freezing temperatures were forecast as follows: At the higher elevations of southern Utah on the 2d and 26th; all of Utah on the 9th; southern Utah on the 10th and 11th; the western valleys of Colorado on the 10th, 11th, 12th, 13th, and 16th; north-central and northwestern New Mexico on the 10th, 11th, and 12th; and at the higher elevations of northern Arizona on the 26th. The forecasts, as a rule, were justified, except in northern Utah on the 10th.

A warning of frost and freezing temperature if the weather cleared was also issued for the western fruit valleys of Colorado on the evening of the 8th, when the conditions were especially critical. Continued cloudy weather and the development of a secondary storm over southern Utah prevented a fall in temperature to a dangerous degree.—*J. M. Sherier.*

SAN FRANCISCO FORECAST DISTRICT.

The Aleutian center of activity was in evidence the greater portion of the month. It sent out no less than six offshoots that affected the weather in the northern portion of this district. The permanent North Pacific HIGH sent out four offshoots that had a more or less marked influence on the weather in the Pacific States.

The LOW on the 7th from Alaska united with a disturbance that streamed northward from Arizona, and it caused quite general rains in California and the North Pacific States.

On the 17th another LOW moved north from Arizona and apparently united with one from the Northwest on the 20th. Considerable rain fell during this period, and a live-stock warning was issued on the 18th for eastern Oregon, eastern Washington, Idaho, and northern Nevada. It was not so windy nor were the rains so cold as expected; therefore this warning was only partly verified.

Another trough-shaped depression formed over California and the region between the Cascades and Rocky Mountains on the 24th. The next morning it presented such features as to call for a live-stock warning in Idaho, which was issued and was fully verified.

The North Pacific HIGH about the 15th receded from off the California coast, which caused a relatively low barometer and unsettled weather to prevail for several days in California and over the ocean to the westward. This unsettled condition culminated in general rains in